

Patrick Chapman

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University of Illinois at Urbana-Champaign
Dept. of Electrical and Computer Engineering
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SmartSpark Energy Systems, Inc.
60 E. Hazelwood Dr.
Champaign, IL 61820 **(217) 344 – 6044**

Degrees

B.S. Electrical Engineering (Summa cum Laude, with Honors), University of Missouri-Rolla, May 1996
M.S. Electrical Engineering, University of Missouri-Rolla, December 1997
Ph.D. Electrical Engineering, Purdue University, August 2000

Academic Positions

Visiting Assistant Professor, UIUC (August 2000 – February 2001)
Assistant Professor, UIUC (February 2001 – August 2007)
Associate Professor with indefinite tenure, UIUC (August 2007 –)

Other Professional Employment

Chief Technology Officer, SmartSpark Energy Systems, Champaign, IL (2004-)
Engineer, P.C. Krause and Associates, Inc., West Lafayette, IN (1995-2000)
Consultant, Magna-Power Electronics, Boonton, NJ (summer 2005)
Freelance Consultant, various civil and patent cases, (2002-)

Professional Registrations

Passed Engineer in Training Exam, Fall 1996.

Honors and Recognitions

Richard M. Bass Outstanding Young Power Electronics Engineer (IEEE, 2006)
Office of Naval Research Young Investigator award (2005)
Grainger Associate (junior professorship), 2002 -
NSF CAREER Award, 2002
“Significant reviewer,” IEEE Power Engineering Society

Courses Taught

Undergraduate – Electric Machinery, Advanced Electric Machinery, Power Electronics, Power Electronics Lab, Electronic Circuits, Renewable Energy Systems, Analog Systems
Graduate – Advanced Topics in Power Electronics, Individual Study

Other Instructional Activities

Revised laboratory manual and course notes for machinery lab

Class field trips for machines course
Developed new course material for Advanced Machinery.
Developed new course and lab material for Electric Machinery.
Created new Renewable Energy Systems course.
Created new Advanced Topics in Power Electronics course.

Undergraduate Advising

Advise ~21 students per semester
Co-advise 2003-2005 Future Energy Challenge student projects
Supervised several undergraduate researchers

Chapters in Books

“Permanent-Magnet Synchronous Machine Drives,” Contribution to The Handbook of Power Electronics, ed. T. Skvarenina, CRC Press LLC, 2001.

Articles in Journals

P.L. Chapman, S.D. Sudhoff, “Multiple Reference Frame Analysis of Non-sinusoidal Brushless DC Drives,” SAE Transactions, Vol. 107, Section 1, 1998, pp. 145-153.

J. L. Tichenor, P. L. Chapman, S. D. Sudhoff, R. Budzinski, “Analysis of Generically Configured PSC Induction Machines,” IEEE Transactions on Energy Conversion, vol. 14, no. 1, pp. 108-114, March 1999.

P. L. Chapman, S. D. Sudhoff, C. A. Whitcomb, “Multiple Reference Frame Analysis of Non-sinusoidal Brushless DC Drives,” IEEE Transactions on Energy Conversion, vol. 14, no. 3, pp. 440-446, September 1999.

P. L. Chapman, S. D. Sudhoff, C. A. Whitcomb, “Optimal Control Strategies for Non-Sinusoidal Permanent-Magnet Synchronous Machine Drives,” IEEE Transactions on Energy Conversion, vol. 14, n. 4, pp. 1043-1050, December 1999.

P. L. Chapman, S. D. Sudhoff, “A Multiple Reference Frame Synchronous Estimator/Regulator,” IEEE Transactions on Energy Conversion, vol. 15, no. 2, pp. 197-202, June 2000.

P. L. Chapman, S. D. Sudhoff, “Design and Precise Realization of Optimized Current Waveforms for an 8/6 Switched Reluctance Motor Drive,” IEEE Transactions on Power Electronics, vol. 17, no. 1, pp. 76-83, January 2002.

S. D. Sudhoff, D. Aliprantis, B.T. Kuhn, P. L. Chapman, “An Advanced Induction Machine Model for Predicting Inverter-Machine Interaction,” IEEE Transactions on Energy Conversion, vol. 17, no. 2, pp. 203-210, June 2002.

- S. D. Sudhoff, B. T. Kuhn, D. Aliprantis, and P. L. Chapman, "Experimental Characterization Procedure for Use with an Advanced Induction Machine Model," IEEE Transactions on Energy Conversion, vol. 18, no. 1, pp. 48-56, March 2003.
- J. Zou, C. Liu, D. Trainor, J. Chen, J. Schutt-Aine, and P. L. Chapman, "Development of Three-Dimensional Inductors Using Plastic Deformation Magnetic Assembly (PDMA)," IEEE Transactions on Microwave Theory and Techniques, vol. 51, no. 4, pp. 1067-1075, April 2003.
- B. G. Dobbs and P. L. Chapman, "A multiple-input dc-dc converter," accepted for IEEE Power Electronics Letters, vol. 1, no. 1, pp. 6-9, March 2003.
- A. Kwasinski, P. T. Krein, and P. L. Chapman, "Time Domain Comparison of Pulse-Width Modulation Schemes," accepted to IEEE Power Electronics Letters, vol. 1, no. 3, pp. 64-68, September 2003.
- A. P. Wu and P. L. Chapman, "Simple Expressions for Optimal Current Waveforms for Permanent-Magnet Synchronous Machine Drives," IEEE Transactions on Energy Conversion, vol. 20, no. 1, pp. 151-157, 2005.
- J.W. Kimball, T.L. Flowers, P.L. Chapman, "Issues with low-input-voltage boost converter design," IEEE Power Electronics Letters, vol. 2, no. 3, pp. 96-99, September 2004.
- R. Balog, Z. Sorchini, J.W. Kimball, P.L. Chapman, P.T. Krein, "Modern Laboratory Based Education for Power Electronics and Electric Machines," IEEE Transactions on Power Systems, vol. 20, no. 2, pp. 538-547, May 2005.
- S. Musunuri, P. L. Chapman, J. Zou, and C. Liu, "Design Issues for Monolithic Dc-Dc Converters," IEEE Transactions on Power Electronics, vol. 20, no. 3, pp. 639-649, May 2005.
- J. D. Owens and P. L. Chapman, "Automatic generation of accurate low-order models for magnetic devices," IEEE Transactions on Power Electronics, vol. 20, no. 4, pp. 732-742, July 2005.
- T. Eram and P.L. Chapman, "Comparison of photovoltaic array maximum power point tracking methods," IEEE Transactions on Energy Conversion, in press.
- J.R. Wells, B.M. Nee, P.L. Chapman, P.T. Krein, "Harmonic elimination control: a more general formulation and new solutions," IEEE Transactions on Power Electronics, vol. 20, no. 6, pp. 1337-1345, Nov. 2005.

N. Benavides, P.L. Chapman, "Power budgeting of a multiple-input buck-boost converter," IEEE Transactions on Power Electronics, vol. 20, no. 6, pp. 1303-1309, Nov. 2005.

S. Musunuri, P.L. Chapman, "Improvement of light-load efficiency using width-switching scheme for CMOS transistors," IEEE Power Electronics Letters, vol. 3, no. 3, pp. 105-110, Sept. 2005.

T. Eswam, J.W. Kimball, P.T. Krein, P.L. Chapman, P. Midya, "Dynamic Maximum Power Point Tracking of Photovoltaic Arrays with Ripple Correlation Control," IEEE Transactions on Power Electronics, in press.

L. Qu and P.L. Chapman, "Extraction of low-order non-linear inductor models from a high-order physics-based representation," IEEE Transactions on Power Electronics, vol. 21, no. 3, pp. 813-817, May 2005.

S.J. Hong, P.L. Chapman, P.T. Krein, and K. Kim, "Selective-area growth and fabrication of recessed-gate GaN MESFET using plasma-assisted molecular beam epitaxy," Journal of Physica Status Solidi (a), vol. 203, no. 7, pp. 1872-1875, May 2006.

A. Davoudi, J. Jatskevich, and P.L. Chapman, "A simple method of introducing conduction losses for average modeling of switched-inductor cells," Electronics Letters, vol. 42, no. 21, pp. 1246-1247, October 2006.

J.R. Wells, X. Geng, P.L. Chapman, P.T. Krein, and B.M. Nee, "Modulation-based harmonic elimination," IEEE Transactions on Power Electronics, vol. 22, no. 1, pp. 336-339, January 2006.

A. Davoudi, J. Jatskevich, and P. L. Chapman, "Averaged modeling of switched-inductor cells considering conduction losses in discontinuous mode," IET Electric Power Applications, vol. 1, p. 402, 2007.

A. Davoudi, J. Jatskevich, P.L. Chapman, and A. Khaligh, "Averaged-switch modeling of fourth-order PWM dc-dc converters considering conduction losses in discontinuous mode," IEEE Transactions on Power Electronics, 2007, in press.

J.R. Wells, A. Khaligh, P.L. Chapman, and P.T. Krein, "Theoretical considerations for generalized selective harmonic control," IEEE Transactions on Power Electronics, in press.

N. Benavides and P.L. Chapman, "Mass-optimal design methodology for dc-dc converters in low-power, portable fuel cell applications," IEEE Transactions on Power Electronics, in press.

Articles in Conference Proceedings

P.L. Chapman, S.D. Sudhoff, "Multiple Reference Frame Analysis of Non-sinusoidal Brushless DC Drives," Proceedings of the SAE Aerospace Power Systems Conference, P-322, 1998, pp. 173-182.

P. L. Chapman, S. D. Sudhoff, C. A. Whitcomb, "Multiple Reference Frame Based Optimal Control of Surface-Mounted Brushless DC Drives," Proceedings of the Naval Symposium on Electric Machines, pp. 115-124. 1998.

P. L. Chapman, S. D. Sudhoff, "Optimal Control of Permanent-Magnet AC Drives with a Novel Multiple Reference Frame Synchronous Estimator/Regulator," Proceedings of the 34th IEEE Industry Applications Society Annual Meeting, pp. 2567-2573, 1999.

S. D. Sudhoff, P. L. Chapman, B. T. Kuhn, D. Aliprantis, "Experimental Characterization of an Advanced Induction Machine Model," 3rd Naval Symposium on Electric Machinery, December 2000.

S. D. Sudhoff, P. L. Chapman, B. T. Kuhn, D. Aliprantis, "Experimental Characterization of an Advanced Induction Machine Model," 3rd Naval Symposium on Electric Machinery, December 2000.

S. D. Sudhoff, P. L. Chapman, B. T. Kuhn, "An Advanced Induction Machine Model For High Frequency Drive Analysis," 3rd Naval Symposium on Electric Machinery, December 2000.

P. L. Chapman, S. D. Sudhoff, "Formulation and Implementation of Optimized Current Waveforms for an 8/6 Switched Reluctance Machine," 3rd Naval Symposium on Electric Machinery, December 2000.

P. L. Chapman, S. D. Sudhoff, "Optimized Waveform Control for an 8/6 Switched Reluctance Motor Drive," 2001 IEEE Applied Power Electronics Conference, pp. 1096-1102, March 2001.

S. D. Sudhoff, B.T. Kuhn, P. L. Chapman, D. Aliprantis, "An Advanced Induction Machine Model For Predicting Machine Converter Interaction," IEEE Power Electronics Specialists Conference, pp. 1096-1102, June 2001.

P. L. Chapman, P. T. Krein, "Micromotor Technology: Electric Drive Designer's Perspective" presented at the 36th IEEE Industry Applications Society Annual Meeting, pp. 1978-1983, October 2001.

J. R. Wells, P. L. Chapman, P. T. Krein, T. Walls, "Linear Induction Machine Design for Instructional Lab Development," Electrical Manufacturing and Coil Winding Conference at the EIC/EMCW-2001 Expo, pp. 319-322, October 2001.

- P. L. Chapman, S. D. Sudhoff, "Dynamic Lossy Inductor Model for Power Converter Simulation," 2002 IEEE Applied Power Electronics Conference, pp. 137-143.
- J. R. Wells, P. L. Chapman, P. T. Krein, "Development of an Open-Frame Linear Machine for Instructional Laboratories," 2002 IEEE Power Electronics Specialists Conference, pp. 479-482.
- S. Musunuri, P. L. Chapman, "Optimization Issues for Fully-Integrated CMOS DC-DC Converters," 2002 IEEE Industry Applications Society Annual Conference, pp. 2405-2410.
- C. Park, P. L. Chapman, S. H. Rhee, S. J. Hong, X. Zhang, P. T. Krein, K. Kim, "GaN Switching Power Device Growth by Plasma Assisted Molecular Beam Epitaxy," 2002 IEEE Industry Applications Society Conference, pp. 576-579.
- J. Owens, P.L. Chapman, "Reduced Finite Element Analysis for Magnetic Devices," Proceedings of the 2002 Electrical Manufacturers and Coil Winders Annual Conference.
- P. L. Chapman and P. T. Krein, "Motor Re-Rating for Traction Applications: Field Weakening Revisited," 2003 IEEE International Electric Machines and Drives Conference, pp. 1388-1391.
- J. R. Wells, P. L. Chapman, and P. T. Krein, "Applications of Ripple Correlation Control of Electric Machinery," 2003 IEEE International Electric Machines and Drives Conference, pp. 1498-1503.
- J. D. Owens and P. L. Chapman, "Reduced FEA-Based State-Space Model of Stationary Magnetic Devices," 2003 IEEE Power Electronics Specialists Conference, pp. 265-271.
- J. R. Wells, P. L. Chapman, and P. T. Krein, "Fundamental Aspects of Ripple Correlation Control of Electric Machinery," 2003 IEEE Power Electronics Specialists' Conference, 1659-1663.
- S. Musunuri, P. L. Chapman, J. Zou, and C. Liu, "Inductor Design for Monolithic DC/DC Converters," 2003 IEEE Power Electronics Specialists' Conference, pp. 227-232.
- A. P. Wu and P. L. Chapman, "Cancellation of Torque Ripple due to Nonidealities of Permanent Magnet Synchronous Machine Drives," 2003 Power Electronics Specialists Conference, pp. 256-261.

S. Musunuri and P. L. Chapman, "Monolithic DC-DC Converter with Multi-layer Spiral Inductor," Proceedings of 2003 IEEE Industry Applications Society Annual Conference, pp. 1270-1275.

J. R. Wells, B. Nee, M. Amrhein, P. T. Krein, and P. L. Chapman, "Low-Cost Single-Phase Powered Induction Motor Drive for Residential Applications," Proceedings of 2004 Applied Power Electronics Conference, pp. 1579-1583.

T. L. Flowers and P. L. Chapman, "Issues with low input voltage boost converter design," IEEE Power Electronics Specialists Conference, 2004, pp. 2152 - 2156.

P. Niu, P. L. Chapman, R. Riemer, and X. Zhang, "Evaluation of motions and actuation methods for biomechanical energy harvesting," IEEE Power Electronics Specialists Conference, 2004, pp. 2100 - 2106.

J. R. Wells, B. Nee, P. L. Chapman, and P. T. Krein, "Optimal harmonic elimination control," IEEE Power Electronics Specialists Conference, 2004, pp. 4214 - 4219.

S. Musunuri, P. L. Chapman, J. Zou, and C. Liu, "Design and Fabrication of PDMA Inductors for Fully Integrated Power Converters," IEEE Power Electronics Specialists Conference, 2004, pp. 4460 - 4466.

J. W. Kimball and P. L. Chapman, "Lowering conduction losses with a parallel MOSFET-IGBT combination," 2004 IEEE Industry Applications Society Annual Meeting, 2004, pp. 1233-1237.

L. Qu, P.L. Chapman, "A Trajectory Piecewise-Linear Approach to Model Order Reduction for Nonlinear Stationary Magnetic Devices," 2004 IEEE Workshop on Computers in Power Electronics, pp. 15-19.

N. Benavides, P.L. Chapman, "Object-oriented modeling of a multiple-input multiple-output flyback converter in dymola," 2004 IEEE Workshop on Computers in Power Electronics, pp. 156-160.

P.L. Chapman, "Multi-resolution switched system modeling," 2004 IEEE Workshop on Computers in Power Electronics, pp. 167-172.

J. Byoun, P.L. Chapman, "Central power management unit as portable power management architecture based on true digital control," 2004 IEEE Workshop on Computers in Power Electronics, pp. 69-73.

R.S. Balog, Z. Sorchini, J.W. Kimball, P.L. Chapman, P.T. Krein, and P.W. Sauer "Blue-box approach to power electronics and machines laboratories," 2005 IEEE Power Engineering Society Summer Meeting.

- P.L. Chapman, "Fundamental micromotor design issues," 2005 IEEE International Electric Machines and Drives Conference, May 2005, pp. 1122-1129. (Invited)
- J.R. Wells, P.L. Chapman, P.T. Krein, "Generalization of Selective Harmonic Control/Elimination," 2005 IEEE Power Electronics Specialists Conference, June 2005, pp. 1358-1363.
- N. Benavides, T. Esum, P.L. Chapman, "Ripple correlation control of a multiple-input buck-boost converter," 2005 IEEE Power Electronics Specialists Conference, June 2005, pp. 160-164.
- S. Musunuri, P.L. Chapman, "Optimization of high-width CMOS transistors for low-power dc-dc converter applications," 2005 IEEE Power Electronics Specialists Conference, June 2005, pp. 2151-2157.
- S. Musunuri, P.L. Chapman, "Design of low power monolithic dc-dc buck converter with integrated inductor," 2005 IEEE Power Electronics Specialists Conference, June 2005, pp. 1773-1779.
- S. J. Hong, P.L. Chapman, P.T. Krein, and K. Kim "Selective-area growth and fabrication of recessed-gate MESFET using plasma-assisted molecular beam epitaxy." 6th International Conference on Nitride Semiconductors, Bremen, Germany, August 28, 2005.
- L. Qu and P.L. Chapman, "Extraction of dynamic low-order non-linear inductor models based on steady state solutions," 2006 IEEE Power Electronics Specialists Conference, in press.
- P. Niu and P.L. Chapman, "Design and performance of linear biomechanical energy conversion devices," 2006 IEEE Power Electronics Specialists Conference, in press.
- J.R. Wells, P.L. Chapman, and P.T. Krein, "Theoretical considerations for selective harmonic control," 2006 IEEE Power Electronics Specialists Conference, in press.
- P.L. Chapman, "Some perspectives regarding integrated electric drives," 3rd AUS Symposium on Mechatronics, American University of Sharjah, United Arab Emirates, April 18-20, 2006, in press. (Invited)
- L. Qu and P.L. Chapman, "Toward a system for automatic extraction of low-order models for magnetic devices," in 2006 IEEE Computers in Power Electronics Workshop, in press.

A. Davoudi, J. Jatskevitch, and P.L. Chapman, "Considering source dynamics in computer-aided parametric average-value modeling of PWM converters," in IEEE Computers in Power Electronics Workshop, in press.

A. Kwasinski, W.W. Weaver, P.L. Chapman, P.T. Krein, "Telecommunications Power Plant Damage Assessment Caused by Hurricane Katrina – Site Survey and Follow-Up Results," in 2006 IEEE International Telecommunications Energy Conference, in press.

A. Davoudi, J. Jatskevich, and P.L. Chapman, "Computer-aided average-value modeling of fourth-order pwm dc-dc converters," in International Symposium on Circuits and Systems, 2007, in press.

A. Davoudi, J. Jatskevich, and P.L. Chapman, "Parametric average-value modeling of multiple-input buck converters," in Proceedings of the 2007 Canadian Conference on Electrical and Computer Engineering, in press.

N.D. Benavides and P.L. Chapman, "Boost converter with a reconfigurable inductor for photovoltaic power processing," in 2007 IEEE Power Electronics Specialists Conference, in press.

A. Davoudi and P.L. Chapman, "Eddy current modeling with order reduction in dynamic magnetic equivalent circuits," in 2007 IEEE Power Electronics Specialists Conference, in press.

L. Qu and P.L. Chapman, "Extraction of dynamic, low-order models for magnetic devices based on finite element analysis with hysteresis," in 2007 IEEE Power Electronics Specialists Conference, in press.

A. Davoudi, J. Jatskevich, P.L. Chapman, "Computer-aided average value modeling of peak current-mode controlled dc-dc converters considering parasitics," in 2007 IEEE Power Electronics Specialists Conference, in press.

J.S. Popovics, G. Gallo, M.D. Shelton, and P.L. Chapman, "A magnetic sensing approach to characterize corrosion in reinforced concrete," SPIE Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring, 2007, in press.

H. Seo, P.L. Chapman, P.T. Krein, and K. Kim, "Non-alloyed ohmic contact using selective-area growth by plasma-assisted molecular beam epitaxy," accepted to 2007 Electronic Materials Conference.

A. Davoudi and P.L. Chapman, "A general framework for automated physics-based reduced-order modeling of electromechanical systems," accepted to the 2007 Summer Computer Simulation Conference.

H. Seo, P.L. Chapman, P.T. Krein, J.-H. Lee, and K. Kim, "DC Performance of High-Power GaN FET Devices with Non-Alloyed Ohmic Contacts Fabricated by PAMBE-Based Selective-Area Growth," 7th International Conference on Nitride Semiconductors, in press.

A. Davoudi, A. Khaligh, and P.L. Chapman, "Low-Order Dynamic Magnetic Equivalent Circuits of Saturated Steel Laminations," 2007 IEEE Vehicle Power and Propulsion Conference, in press.

B. Nee and P.L. Chapman, "Integration of filter components and permanent-magnet machines," 2007 IEEE Vehicular Power and Propulsion Conference, in press.

A. Khaligh, P. L. Chapman, A. Davoudi, and J. Jatskevich, "Realization of parasitics in the stability of dc-dc converters loaded by constant-power loads in discontinuous conduction mode," in Proc. IEEE Vehicular Power and Propulsion Conference, Arlington, TX, Sept. 2007.

G. Gallo, J. Popovic, and P.L. Chapman, "Basis and applications of GMR sensors for reinforced concrete elements", in Spring 2008 American Concrete Institute Conference, in press.

A. Khaligh and P.L. Chapman, "Reduction of Output Capacitance in Dc-Dc Converters using Anticipated Load Transients," IEEE 2008 Applied Power Electronics Conference, 2008.

A. Khaligh, Andrew Philip Friedl, and P. L. Chapman, "Anticipatory control of voltage regulator modules, a novel approach for low-voltage high-current microprocessor applications," in IEEE 33rd Industrial Electronics Annual Conference, Taipei, Taiwan, Nov. 2007, in press.

Invited Lectures

"Hybrid and other Clean-Fuel Vehicles," presented at IEEE Central Illinois Section Meeting, March 13, 2003.

"Biomechanical Energy Conversion," presented to Illinois Institute of Technology, September 5, 2003.

"Design and Construction of Monolithic Power Management ICs," presented to Laboratory for Electromagnetic and Electronic Systems at Massachusetts Institute of Technology, November 7, 2003.

"Research on Hybrid Energy Systems," presented to University of Missouri-Rolla, Nov. 3, 2004.

"Power Electronics and Connectivity for New and Alternative Energy Sources for the Military," to be presented at Institute of Defense and Governments Affairs New and Alternative Energy Sources Conference: Next Generation Power for the Military, Washington DC, June 27, 2005.

P.L. Chapman, "Power systems and communications damage due to Hurricane Katrina," National Science Board Workshop, Toward a National Agenda for Hurricane Science and Engineering, Workshop #2: The Research Community, Boulder, Colorado, February 8, 2006.

P.L. Chapman, "Some perspectives regarding electric drives," 3rd AUS International Symposium on Mechatronics, American University of Sharjah, United Arab Emirates, April 18-20, 2006.

P.L. Chapman, "Renewable energy activities at UIUC: A Power Electronics Perspective," Fueling Change in Renewable Energy, Urbana, IL, April 2007.

P.L. Chapman, "Experiences of a professor with the SBIR program and an alternative-energy startup," Enhancing Linkages between Universities and Small Businesses in EPSCoR Jurisdictions, Portland, Maine, Oct. 15, 2007.

Other

S. D. Sudhoff, J. T. Alt, P. L. Chapman, K. A. Corzine, S. F. Glover, J. L. Tichenor, "DC Power System Status Report," Interim Technical Progress Report for Naval Surface Warfare Center and P.C. Krause and Associates, Inc., University of Missouri-Rolla, December 20, 1995.

S. D. Sudhoff, J. T. Alt, B. T. Kuhn, P. L. Chapman, K. A. Corzine, S. F. Glover, J. L. Tichenor, "DC Power System Status Report," Interim Technical Progress Report for Naval Surface Warfare Center and P.C. Krause and Associates, Inc., University of Missouri-Rolla, May 23, 1996.

S. D. Sudhoff, J. T. Alt, P. L. Chapman, K. A. Corzine, J. L. Drewniak, S. F. Glover, B. T. Kuhn, "Analysis and Specification of Full Scale Engineering Development Integrated Power System," Interim Technical Report for Naval Sea Systems Command, Purdue University and P.C. Krause and Associates, Inc., May 1, 1998.

S. D. Sudhoff, J. T. Alt, P. L. Chapman, K. A. Corzine, J. L. Drewniak, S. F. Glover, B. T. Kuhn, "Analysis and Specification of Full Scale Engineering Development Integrated Power System," Final Technical Report for Naval Sea

Systems Command, Purdue University and P.C. Krause and Associates, Inc., February 19, 1999.

Krein, Chapman, et al, Annual Report for Grainger Center for Electric Machines and Electromechanics, 2000-2001, University of Illinois.

P. L. Chapman, P. T. Krein, "Smaller is Better?" IEEE Industry Applications Magazine, Jan. 2003.

P.W. Sauer, P.T. Krein, P.L. Chapman, "Course Guide and Laboratory Information," ECE 333 lab manual, significant revisions, 2003.

Krein, Chapman, et al, Annual Report for Grainger Center for Electric Machines and Electromechanics, 2001-2002, University of Illinois.

P.L. Chapman, B.G. Dobbs, "Multiple-Input Buck-Boost Converter," US Patent application submitted.

P.L. Chapman, T.L. Flowers, J.W. Kimball, P.T. Krein, "Startup technique for arbitrarily low input voltage power converters," US Patent application submitted.

Krein, Chapman, et al, Annual Report for Grainger Center for Electric Machines and Electromechanics, 2002-2003, University of Illinois.

Krein, Chapman, et al, Annual Report for Grainger Center for Electric Machines and Electromechanics, 2003-2004, University of Illinois.

P.L. Chapman, "Fully integrated milliwatt power converters on silicon," IEEE Power Electronics Newsletter, fourth quarter, 2004, in press.

P.L. Chapman, P.T. Krein, "Low-cost motor controller for residential and industrial applications," Final Report for California Energy Commission's Energy Innovations Small Grant Program, 02-02, 2003.

M. Amrhein, P.T. Krein, P.L. Chapman, and B.I. Fierro, "Motor re-rating for traction applications - an experimental evaluation of re-rated induction machines," IEEE Industry Applications Magazine, in press.

Grants, Contracts, and Gifts Received

Years (Inclusive)	Brief Title or Description	Source of Funds	Total Funding	Funding Allocated to this Professor	# of PI's & Lead PI if not this Professor
2000-2003	Optimal Control of Motor Drives	Grainger Center for Electric Machinery and Electromechanics	100,000	80,000	1

2001-2002	Numerical Analysis Techniques for Magnetic Devices	Grainger Center for Electric Machines and Electromechanics	30,000	30,000	1
2001-2003	Monolithic Power Conversion Circuits	Grainger Center for Electric Machinery and Electromechanics	100,000	60,000	2
2002-2007	CAREER: Optimal Diversification of Multiple Energy Sources	National Science Foundation	374,502	374,502	1
2002 -	Grainger Associate	Grainger Foundation	15,000/yr	15,000/yr	1
2002-	Flexible Digital PWM Control for Embedded Power Converters	Motorola	90,000/yr; 2-3 yrs	~30,000/yr	3; Krein
2002-2003	Energy Conversion Techniques for Low Voltage and Low Power Circuits	Grainger Center for Electric Machinery and Electromechanics	20,000	20,000	1
2003-2005	EPNES: Integrating Electrical, Economic, and Environmental Factors into Flexible Power System Engineering	National Science Foundation and Office of Naval Research	599,955	150,000	7; Krein
2002	College of Engineering Project to provide security consulting on rebuilding of 7 World Trade Center: Electrical System Physical Security	Silverstein Properties, Inc.	\$275,000	\$13,500	~10; Daniel
2003-2006	Biomechanical Energy Conversion Technology for Future Marine Corps Operations	Office of Naval Research	\$299,381	\$180,000	2
2003	Low Cost, Energy Saving Motor Controller for Residential and Industrial Buildings	California Energy Commission: Energy Innovations Small Grant Program	\$69,482	\$60,000	2
2003	Low-Cost Automatic Series Battery Equalization: A Commercial Plan for Advanced Energy Processing Technologies	College of Engineering New Technology Initiative - Grainger Foundation	\$100,000	\$33,000	2; Krein
2004	Intel Scholar	Intel via COE	\$5,000	\$5,000	1
2004-2005	Power Management Research for Direct Liquid Methanol Fuel Cells	INI Power Systems	82,370	72,000	2
2005-2008	Automated Extraction of Low Order Models for Magnetic Devices	Office of Naval Research	\$300,000	\$300,000	1
2005-2006	Katrina SGER: Damage Assessment of Power	National Science Foundation	\$30,000	\$15,000	2

	Infrastructure for Distribution, Telecommunications and Back-up				
2005-2006	Simulation Modeling and Beta Demonstration of Hybrid Magnetic-Dielectric Components	Northrop Grumman Space Technology	\$17,500	\$17,500	1
2005-2006	Minimization of Inductor Size for DC-DC Converters	Advanced Analogic Technologies, Inc.	\$15,000	\$15,000	1
2006-2007	Photovoltaic System and Student Team Costs for 2007 National Solar Decathlon Entry	Illinois Clean Energy Community Foundation	\$150,000	\$150,000	1
2006-2009	Power Converter Control: A Nonlinear Time-Domain Framework to Optimize Efficiency and Performance	National Science Foundation	\$239,718	\$60,000	2; Krein
2006-2009	Development of Sensing Method for Complete in Situ Assessment of Steel Corrosion in Concrete	National Science Foundation	\$239,988	\$84,033	2; Popovics
2006-2007	Improved hybrid passive device synthesis and initial active device integration for high performance power converters	Northrop Grumman Space Technology	\$17,500	\$17,500	1
2007-2008	Phase I STTR: Design optimization of human-powered hybrid energy system	SmartSpark Energy Systems / National Science Foundation	\$75,000	\$75,000	1
2007-2008	Wind Powered Electrical Systems – Highway Rest Areas and Weigh Stations and Team Section Buildings	Illinois Department of Transportation and Illinois Center for Transportation	\$70,000	\$70,000	1

Areas of Research

Power Electronics
 Electric Drives
 Monolithic Integrated Power Circuits
 Numerical Magnetic Modeling
 Hybrid energy source systems
 Biomechanical Energy Conversion

M.S. Thesis Students (13 total) Advised and Actual or Anticipated Graduation Date

Jason R. Wells (December 2002), *Surya Musunuri* (August 2003), *James Owens* (October 2002), *Alan Wu* (October 2003), *Bryan Dobbs* (December 2003),

Theresa Flowers (December 2003), *Brett Nee* (August 2004), *Nicholas Benavides* (2004), *Trishan Esrām* (2004), *Daisy Chen* (2006), *Matthew Meinhart* (2006), *Yongxiang Chen* (2007), *Melanie Shelton* (anticipated 2007), *Piotr Wiczowski* (anticipated 2008)

Ph.D. Thesis Students (10 total) Advised and Actual or Anticipated Graduation Date

Jason Wells (2006), *Jaesoo Byoun* (2006), *Penglin Niu* (passed prelim, anticipated 2007), *Surya Musunuri* (August 2005), *Liyan Qu* (passed prelim, anticipated 2007), *Brett Nee* (passed prelim, anticipated 2007), *Trishan Esrām* (anticipated 2007), *Nick Benavides* (passed prelim, anticipated 2007), *Ali Davoudi*, (passed qual, anticipated 2008), *Yingying Kuai* (anticipated 2009)

Post-Docs and Other Visitors

Alireza Khaligh, 2006-2007.

Editorships of Journals or Other Learned Publications

Associate Editor, IEEE Power Electronics Letters, 2002-2006
Editor-in-Chief, IEEE Transactions on Power Electronics (Letters), 2007-
Editor, IEEE Transactions on Energy Conversion, 2007-

Other Scholarly Activities (Past Five Years)

“Switched Reluctance Drives and Their Control,” ECE Power and Energy Systems Seminar, University of Illinois at Urbana-Champaign, August 28, 2000.

“Emerging Technologies in Energy Conversion,” ECE Graduate Seminar, University of Illinois at Urbana-Champaign, February 8, 2001.

“Experiences with Advanced Learning Techniques,” Deans’ Seminar for Faculty Teaching College, University of Illinois at Urbana-Champaign, March 27, 2001.

"Power and Energy Systems: Backbone of Electrical Engineering," presented at ECE Explorations, UIUC, Septemeber 26, 2001.

"Dynamic Lossy Inductor Model for Power Converter Simulation," presented at ECE Power and Energy Graduate Seminar, University of Illinois, October 29, 2001.

"Fundamental Questions About Torque and Force in Electric Machinery," presented as a Power and Energy Graduate Seminar, University of Illinois, February 4, 2002.

"Advanced Induction Machine Model for Predicting Machine/Converter Interaction," presented for ECE Power Seminar, UIUC, October 14, 2002.

"Biomechanical Energy Conversion: Challenges in Power Electronics and Electromechanics," presented at Power and Energy seminar, University of Illinois, March 10, 2003.

Session Organizer, 2003 IEEE Industry Applications Society, Induction Machine Diagnostics, Salt Lake City, UT.

Session Organizer and Session Chair, 2003 IEEE Industry Applications Society, Power Devices, Salt Lake City, UT.

"Nonlinear Techniques and Controls in Power Electronics and Electric Drives," presented at the 2003 Workshop on Nonlinear Control of Mechanical Systems, Allerton Conference, UIUC, October 4, 2003.

"Energy Source Diversification," ECE Power and Energy Seminar, February 2, 2004.

Session organizer for Electric Machinery Committee, 2004 IEEE Industry Applications Society Conference.

Session organizer and chair for Power Devices and Components Committee, 2004 IEEE Industry Applications Society Conference.

P.L. Chapman, "Multiple-Input Power Converters," UIUC Power Area Seminar, February, 2004.

Session organizer, 2004 Power Electronics Specialists Conference.

Session organizer and session chair for 2004 IEEE Industry Applications Society Annual Meeting, Oct. 2004.

Session chair, IEEE Applied Power Electronics Conference, 2005, 2006.

Publications Chair, 2005 IEEE Electric Ship Technologies Symposium.

P.L. Chapman, "Time-invariant modeling of dc-dc converters without averaging," ECE Power and Energy Systems Seminar, April 10, 2006.

Member of Program Committee for the 2007 IEEE Power Electronics Specialists Conference.

Professional Society

Institute of Electrical and Electronics Engineers; Student Member (1994-1996), Member (1997-Present)

IEEE Technical Societies: Education, Industry Applications, Power Electronics, Power Engineering

IEEE Committees: PES Electric Machines and Drives (DC, PM, and Special Machines subcommittee), Industry Applications Society Electric Machinery Committee

Archival Paper Review Activities: IEEE Transactions on Energy Conversion, IEEE Transactions on Education, IEEE Transactions on Power Electronics, IEEE Transactions on Magnetics

Conference Paper Review Activities: Power Electronics Specialists Conference (2001-2003), 2001 Conference on Decision and Control, Industry Applications Society Annual Conference (2003)

Chapter President, IEEE Power Engineering Society, Central Illinois Section, 2003-

Program Chair, 2004 IEEE Computer in Power Electronics (COMPEL) Workshop.

Conference committee, Publication Chair, 2005 IEEE Applied Power Electronics Conference.

Session chair, IEEE Applied Power Electronics Conference, 2005.

IEEE Power Electronics Society Administrative Committee, Historian (2005-).

IEEE Power Electronics Society Administrative Committee, Member at Large (2006-).

IEEE Electric Ship Technologies Symposium, Publications Chair (2005, 2007).

University

Associate Director, Grainger Center for Electric Machinery and Electromechanics, August 2000 -

Power and Energy Systems Area Committee, August 2000 -

College of Engineering Placement Committee, Departmental Representative, 3/01-present

ECE Graduate Committee (August 2001 - Spring 2003)

ECE Fellowship Committee (Fall 03-)

ECE Scholarships, Student Awards, and Honors Committee (Fall 2003-)

College of Engineering Subcommittee for proposed GE330 course, 2001

Committee for Sustainable Campus Environment, Energy Subcommittee, 2003-

Judge for ECE Undergraduate Research Symposium, Spring 2003.

Faculty tour guide, ECE Scholar's Day, December 6, 2003.

Represented Power Area at ECE Advising Fair, 10/27/04.

ECE Curriculum Committee, 2005-.

Federal and State

Review Panel for National Science Foundation unsolicited proposals, January 2003.

Reviewer for California Energy Commission small grants program.

Panel Review for US Department of Agriculture, January 2004, February 2005, and February 2007.

Panel reviewer for National Science Foundation Research Experiences for Undergraduates program, Sept. 2004.

Panel reviewer for unsolicited National Science Foundation proposals, January 2006.

Improvement Activities

2000-2001 Faculty Teaching College, UIUC

Effective Teaching: A Workshop, UIUC, October 13-14, 2000.

Attended seminar: "Exemplary College Teaching and Learning," August 23, 2001.

Attended "Marketing Your Research, Managing Your Lab" Seminar hosted by Prof. Gary Eden, Faculty Teaching College, UIUC, September 4, 2001.

Attended "NSF/ONR-Faculty Workshop on Teaching of Courses in Power Electronics and Electric Drives," Tempe, AZ, January 5-7, 2003.

Attended "Reforming Power Engineering Education," NSF Workshop, Orlando, FL, Feb 17-18, 2006.

Attended workshop "Logistics in Support of Distributed Operations S&T Roadmap," Quantico, Virginia, March, 2007.